DOCUMENT RESUME

ED 097 585 CE 002 405

TITLE	Aircraft Metal Skin Repair and Honeycomb Structure Repair; Sheet Metal Work 3: 9857.02.
INSTITUTION	Dade County Public Schools, Miami, Fla.
PUB DATE	Feb 74
NOTE	17p.; An Authorized Course of Instruction for the Quinmester Program
EDRS PRICE	MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS	Course Content; Course Objectives; *Curriculum Guides; Job Skills; Metallurgy; *Metal Working Occupations; Post Secondary Education; Secondary Grades; *Sheet Metal Work; *Trade and Industrial Education
IDENTIFIERS	*Quinmester Program

ABSTRACT

The course helps students determine types of repairs, compute repair sizes, and complete the repair through surface protection. Course content includes goals, specific objectives, protection of metals, repairs to metal skin, and honeycomb structure repair. A bibliography and post-test are appended. A prerequisite for this course is mastery of the skills covered in the course "Aircraft Assembly and Surface Repair 1". (NH)

AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRO
DUCED EXACTLY AS RECEIVED FROM
THE PERSON OR ORGANIZATION ORIGIN
ATING IT. POINTS OF VIEW OR OPINIONS
STATED DO NOT NECESSARILY REPRE
SENT OFFICIAL NATIONAL INSTITUTE OF
EDUCATION POSITION OR POLICY

Course Outline

SHEET METAL WORK 3 - 9857
Aircraft Metal Skin Repair and Honeycomb Structure Repair)

Department 48 - Quin 9857.02

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION•1974

D A D E C O U N T Y P U B L I C S C H O O L S

1 4 5 0 N O R T H E A S T S E C O N D A V E N U E

M I A M I, F L O R I D A 33132

Course Outline

SHEET METAL WORK 3 - 9857
(Aircraft Metal Skin Repair and Honeycomb Structure Repair)

Department 48 - Ouin 9857.02

county office of

VOCATIONAL AND ADULT EDUCATION

THE SCHOOL BOARD OF DADE COUNTY

Mr. G. Holmes Braddock, Chairman
Mr. William H. Turner, Vice-Chairman
Mrs. Ethel Beckham
Mr. Alfredo G. Duran
Mrs. Phyllis Miller
Mr. Robert Renick
Dr. Ben Sheppard

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

February, 1974

Published by the School Board of Dade County

Course Description

9857	48	9857.02	Aircraft Metal Skin Repair & Honeycomb Structure Repair
State Category Number	County Dept. Number	County Course Number	Course Title

This is an advanced quinmester course which will include determining types of repairs needed, computing repair sizes and completing repair through surface protection. Understanding honeycomb construction and repair, will also be covered. This is a three quinmester credit course.

Indicators of success: Prior to entry into this course, the vocational student must display mastery of the skills indicated in Aircraft Assembly Riveting and Surface Repair 1 (9855.02).

Clock Hours: 135

PREFACE

The following course outline is a second quinmester course and will serve as a guide to the instructor teaching in the field of advanced sheet metal work.

Prior to entry into this course the student must display mastery of the skills indicated in Aircraft Assembly Riveting and Surface Repair 1 (9855.02).

This course is composed of four blocks of instructions, which are further subdivided into several units each, requiring one quinmester of 135 hours. Emphasis is placed on the use of visual aids, mock-ups, cut-aways, transparencies, films, instructional sheets and manipulative shop practice.

Upon completion of this course the student will have a basic understanding of types of repairs needed on aircraft metal skin, honeycomb construction and honeycomb repairs.

This outline was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
With Suggested Hourly Breakdown

Page

PREFACE i
GOALS iii
SPECIFIC BLOCK OBJECTIVES iv
BIBLIOGRAPHY. 3

BLOCK

I. PROTECTION OF METALS (15 Hours)
Corrosion of Aircraft Metals. 1
Applying Corrosion Preventatives. 1

II. REPAIRS TO METAL SKIN (75 Hours)
Making Sheet Metal Skin Repairs 1
Making Repairs Requiring Joggling 1

III. HONEYCOMB STRUCTURE REPAIR (45 Hours)
Repairing Honeycomb Material. 1
Repairable Damage to Honeycomb Material 2

IV. QUINMESTER POSTTEST

APPENDIX: QUINMESTER POSTTEST SAMPLE 7

GOALS

The student must be able to demonstrate:

1. The skills and knowledge necessary to make aircraft metal skin repairs.
2. The skills and knowledge necessary to perform and apply metal protection.
3. The ability to identify honeycomb materials and to make general honeycomb repairs.
4. The ability to properly interpret F.A.A. regulations pertaining to sheet metal and honeycomb repairs.
5. Ability inherent to the proper attitudes which will make him a desirable employee in industry.

SPECIFIC BLOCK OBJECTIVES

BLOCK I - PROTECTION OF METALS

The student must be able to:

1. Identify and state the different types of corrosion affecting aircraft metals.
2. Exhibit the ability to remove corrosion from aluminium and steel.
3. Demonstrate the ability to apply corrosion preventative materials on aircraft metals.

BLOCK II - REPAIRS TO METAL SKIN

The student must be able to:

1. Exhibit the ability to make general repairs on aircraft metal skin.
2. Demonstrate the ability to make repairs requiring joggling.

BLOCK III - HONEYCOMB STRUCTURE REPAIR

The student must be able to:

1. Exhibit the skills and understanding needed to do honeycomb structure repairs.
2. State the various methods of repairing damaged honeycomb material.
3. Exhibit the ability to identify the materials needed to make honeycomb repairs.

BLOCK IV - QUINMESTER POSTTEST

The student must be able to:

1. Satisfactorily complete the quinmester posttest.

Course Outline

SHEET METAL WORK 3 - 9857
(Aircraft Metal Skin Repair and Honeycomb Structure Repair)

Department 48 - Quin 9857.02

I. PROTECTION OF METALS

A. Corrosion of Aircraft Metals
   1. Types of corrosion
   2. Removal from aluminium
   3. Removal from magnesium
   4. Removal from steels

B. Applying Corrosion Preventatives
   1. Paints and primers
   2. Electroplating metal surfaces
   3. Metalizing metal surfaces

II. REPAIRS TO METAL SKIN

A. Making Sheet Metal Skin Repairs
   1. External skin patches
      a. Round
      b. Square
      c. Oval
      d. Rectangular
   2. Flush Skin Patches
      a. Round
      b. Oval
      c. Square
      d. Rectangular

B. Making Repairs Requiring Joggling
   1. Joggling the doubler
   2. Attaching doubler to adjoining members
   3. Inspecting repairs in accordance with repair manuals

III. HONEYCOMB STRUCTURE REPAIR

A. Repairing Honeycomb Material
   1. Inspecting damaged area
      a. Stub meter
      b. Tap hammer
      c. Nitric acid test
   2. Classifying damages
      a. Class I
      b. Class II
      c. Class III
      d. Class IV

B. Repairable Damage to Honeycomb Material
   1. Checking necessary safety precautions
   2. Making repair to area of minor damage
   3. Making repair to area of major damage

IV. QUINMESTER POSTTEST

BIBLIOGRAPHY
(Aircraft Metal Skin Repair and Honeycomb Structure)

Basic References:

None

Supplementary References:

1. Airframe and Power Plant Mechanics - Airframe Handbook AC-65-15. F.A.A. Washington, D.C.: U.S. Government Printing Office, 1972. Pp. 538.

2. Airframe and Power Plant Mechanics - General Handbook AC-65-9. F.A.A. Washington, D.C.: U.S. Government Printing Office, 1970. Pp. 497.

3. Airframe Mechanic Written Exam Guide. Fort Worth, Texas: Acme School of Aeronautics, 1968. Pp. 63.

4. Bent, Ralph D. and McKinley, James L. Aircraft Maintenance and Repairs. New York: McGraw-Hill Book Company, 1955. Pp. 444.

5. Department of the Army. Fundamentals of Airframe Maintenance. Washington, D.C.: U.S. Government Printing Office, 1965. Pp. 431.

6. Federal Aviation Administration. Accentable Methods, Techniques and Practices - Aircraft Inspection and Repairs - Advisory Circular 43-13-1. Washington, D.C.: U.S. Government Printing Office, 1965. Pp. 232.

7. Leavell, Stuart and Bunnay, Stanley. Standard Aircraft Handbook. Los Angeles: Aero Publishers Inc., 1952. Pp. 159.

8. Northrup Institute of Technology. Basic Science for Aerospace Vehicles. 3rd ed. New York: McGraw-Hill Book Company, 1963. Pp. 320.

9. United States Dept. of Air Force. Airframe Maintenance Manual 52-11. Washington, D.C.: U.S. Government Printing Office, 1964. Pp. 314.

10. U.S. Naval Air Technical Training Command. Aircraft Structural Maintenance. Navpers 10308B. Washington, D.C.: U.S. Government Printing Office, 1969. Pp. 414.

A P P E N D I X

Quinmester Posttest Sample

QUINMESTER POSTTEST

Name _____ Date _____ Score _____

Multiple Choice Test Items

Each statement needs a word, a figure, or a phrase to make it correct. Only one of the choices listed is correct. Place the letter of the choice you make in the space provided at the left edge of the sheet.

___ 1. Electrolytic corrosion is usually caused by:

a. Improper ground
b. Static electricity
c. Two dissimilar metals
d. Too high a voltage

___ 2. Spilled battery acid from a nickel cadmium battery is neutralized by:

a. Aviation gas
b. Mineral spirits
c. Boric acid
d. White gas

___ 3. Aerobic bacteria feeds on:

a. Rubber fuel cells only
b. Fuel cells sealants
c. Jet A fuel only
d. Oxygen

___ 4. Corrosion can be controlled to a minimum if you:

a. Keep aircraft clean and dry at all times
b. Keep aircraft in the hanger
c. Inspect aircraft annually
d. Ground the aircraft at all times

___ 5. The emphasis on corrosion control should be on:

a. Annual inspection basis
b. Preventive maintenance basis
c. The manufacture of the aircraft
d. All of the above

___ 6. Exfoliation can be detected:

a. By its dark blue color
b. By its ability to be peeled off in scales or flakes
c. By magnafluxing
d. The chalky powder on the surface of the metal

___ 7. Battery compartments are protected from corrosion by:

a. Grounding the battery
b. Hermetically sealing the compartment
c. Checking electrolyte daily
d. Using acid proof paints and proper venting

___ 8. Aircraft steel tubing is protected from corrosion internally by:

a. Hot line oil or linseed oil
b. Covering with fabric
c. Cadmium plating
d. Rosette welding

___ 9. A round bulge appearing in the aluminium surface is an indication of:

a. Fretting corrosion
b. Paint blistering
c. Intergranular corrosion
d. Air bubble

___ 10. How would you determine the proper paper cleaning agent for a certain job?

a. A-C-65-9
b. A-C-43-13-1
c. Manufacturer's standard processes
d. F.A.R. Part 145

___ 11. What is to be used as the authority for making metal skin repairs?

a. F.A.R. A-C-65-9
b. F.A.R. 43-13-1
c. A-C-65-15
d. Manufacturer's structural repair manual for the aircraft

___ 12. The size and shape of the patch is determined in general by the:

a. Number of patches in the damaged area
b. Number of rivets required in the repair
c. Thickness of metal
d. Type of metal

___ 13. The metal patch which provides a good concentration of rivets within the critical stress area, eliminates dangerous stress concentration and is very simple to lay out and should be used whenever possible in the:

a. Round patch
b. Flush patch
c. Rectangle patch
d. Elongated octagonal patch

____ 14. In aircraft construction a panel is:

a. Any single sheet of metal covering
b. Any metal covering in the cockpit
c. Only found on aircraft bulkhead
d. A stringer repair

____ 15. The patch which is used because of the uniform distribution of rivets and where the direction of the stress is unknown or where it is known to change frequently is the:

a. Elongated patch
b. Oval
c. Round
d. Square

____ 16. An offset formed on an angle strip to allow clearance for a sheet or an extrussion is called a:

a. Spar
b. Joggle
c. Stringer
d. All of the above

____ 17. A joggle can be formed by:

a. Cornice brake
b. Joggle blocks
c. Steel or aluminium dies
d. All of the above

____ 18. When using joggling dies for the firs time, test them for accuracy on a:

a. Piece of steel first
b. Piece of waste stock
c. Piece of plexiglass
d. Piece of aircraft fabric

____ 19. Where aerodynamic smoothness is required use the:

a. Lap patch
b. Sealant repair only
c. Flush patch
d. All of the above

____ 20. Metal bonded honeycomb construction:

a. Better able to withstand sonic vibrations
b. Low cost when compared with fastener and installation cost of conventional structures
c. Reduces the number of parts needed and greatly reduces sealing problems
d. All of the above

____ 21. Most of the damages to honeycomb assemblies result from:

a. Flight loads
b. Ground handling
c. Sonic vibration
d. All of the above

____ 22. What is the simplest way to test for delamination?

a. Destructive testing
b. Metallic ring test
c. Dye penetrate testing
d. All of the above

____ 23. What tool is used to remove damaged material from metal bonded honeycomb panels?

a. Aviation snips
b. Micro-shaver
c. Pneumatically powered hand-operated-router
d. Air drill motor

____ 24. What is the maximum allowable depth for removal of damaged honeycomb core material?

a. Minimum depth that will allow you to remove all the damage
b. One inch beyond the damaged area
c. Only 1/2 of the damaged core material
d. There is no set allowable depth

____ 25. How many layers of glass fabric cloth are required in the repair of the flat surface of a metal bonded honeycomb panel?

a. Three layers of number 181 glass fabric cloth
b. One layer of number 181 glass fabric cloth
c. Two layers of number 181 glass fabric cloth
d. Four layers of number 181 glass fabric cloth

ANSWER KEY TO QUINMESTER POSTTEST

1. c
2. c
3. d
4. a
5. b
6. b
7. d
8. a
9. c
10. c
11. d
12. b
13. d
14. a
15. c
16. b
17. d
18. b
19. c
20. d
21. d
22. b
23. c
24. a
25. c